Exercise 3:

Introduction to Simulink

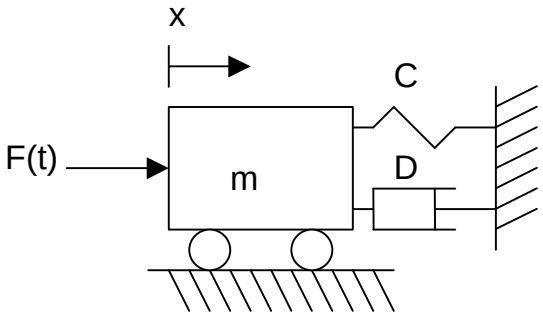
Simulink is a very powerful simulation environment. In this exercise some models are build up to learn the basic handling of Simulink that is:

- selection of model blocks from the libraries
- connection the model blocks
- change of the model parameters
- run the simulation and document the results.

a) Explore the model libraries of Simulink. Special have a look on continuous, source and sink library. Which block do you already know?

b) Simulate the step response of the transfer-function $G(s) = \frac{4}{1+5s}$: Display the result in a plot windows and export the results to the Matlab workspace. Repeat the simulation using different signal types of the signal generator of Simulink like sine, sawtooth, square and random.

c) Build up the model of a one-mass spring system.



Moving mass model

$m \cdot \ddot{x} = -C \cdot x - D \cdot \dot{x} + F(t)$ with

m = 10 kg; C=100 N/m; D=3 N*sec/m;

Calculate the step response and investigate the influence of the physical parameters on the simulation results!

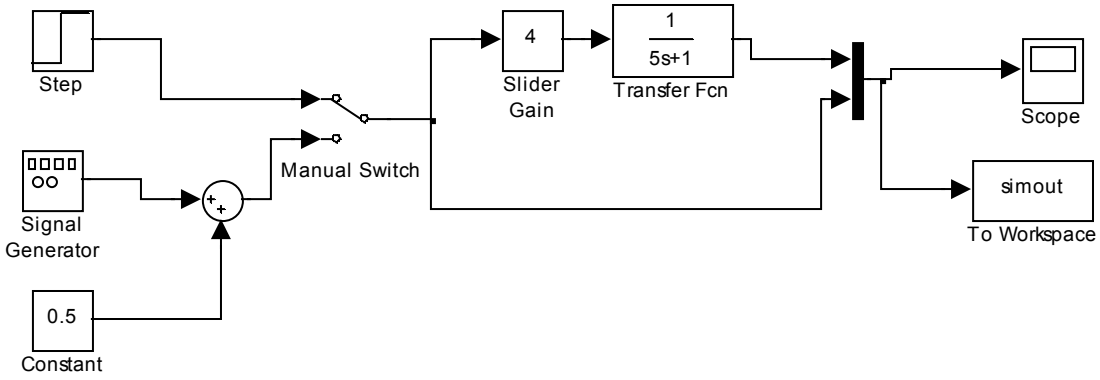
Document and print your work using word.

Exercise 3:

Introduction to Simulink

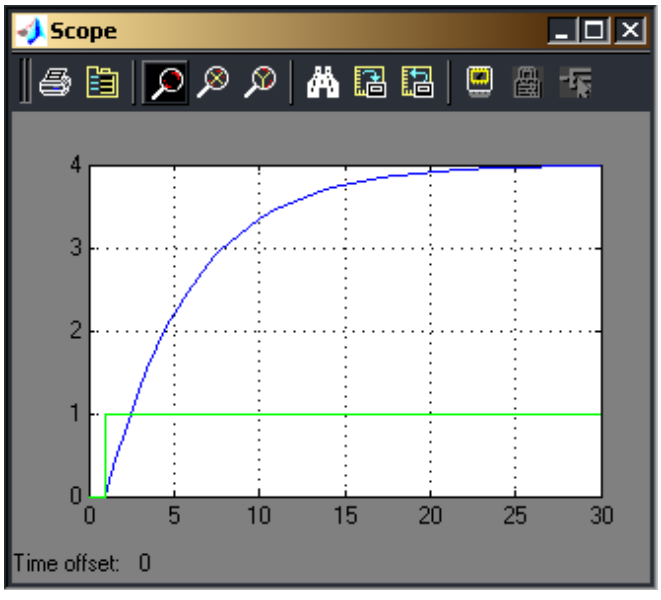
a) Hilfreiches Werkzeug zum Auffinden von Blöcken ist Find im Library Browser.

b) Erzeugtes Simulink Model zum experimentieren.

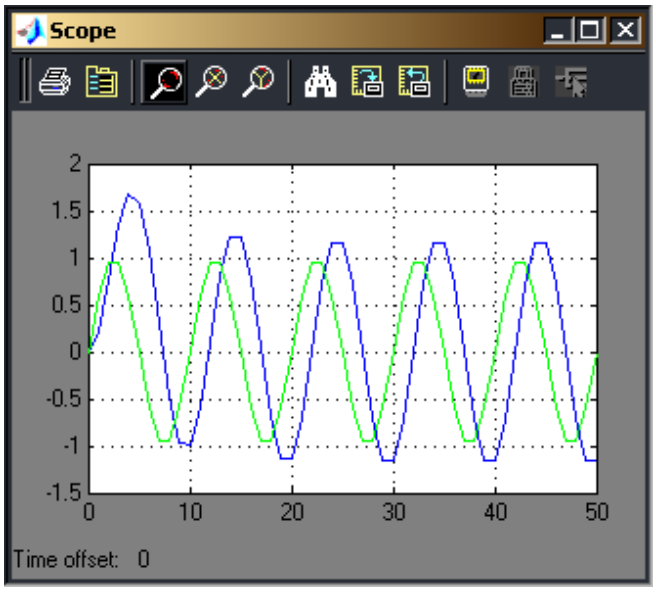


- Mit Hilfe des Manuel Switch lässt sich zwischen dem Signalgenerator und der Sprungfunktion umschalten.
- Werden die Simulationsdauer auf **inf** gesetzt, die Parameter des Scopes und des Signalgenerators aneinander angepasst, so kann mit dem Slider Gain die Verstärkung während der Simulation variiert werden.
- Export der Daten über simout block oder Scope (Data history). Es wird dabei eine Structure im Workspace mit den Werten erzeugt.

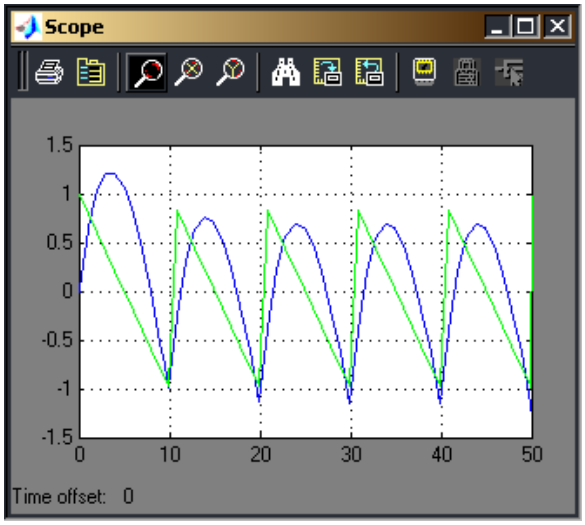
<u>Sprungantwort:</u>



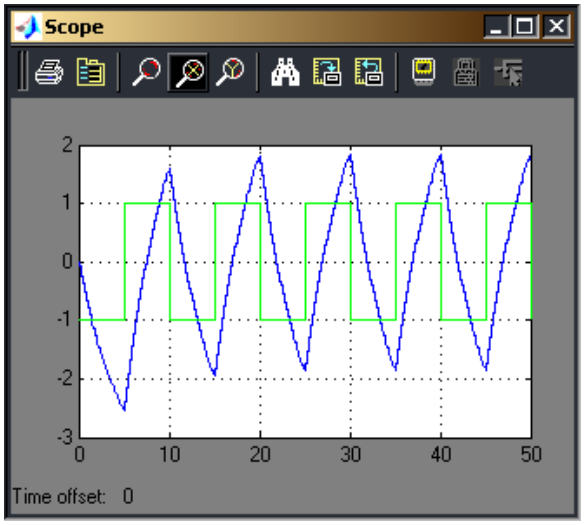
<u>Sinus-Eingang:</u>



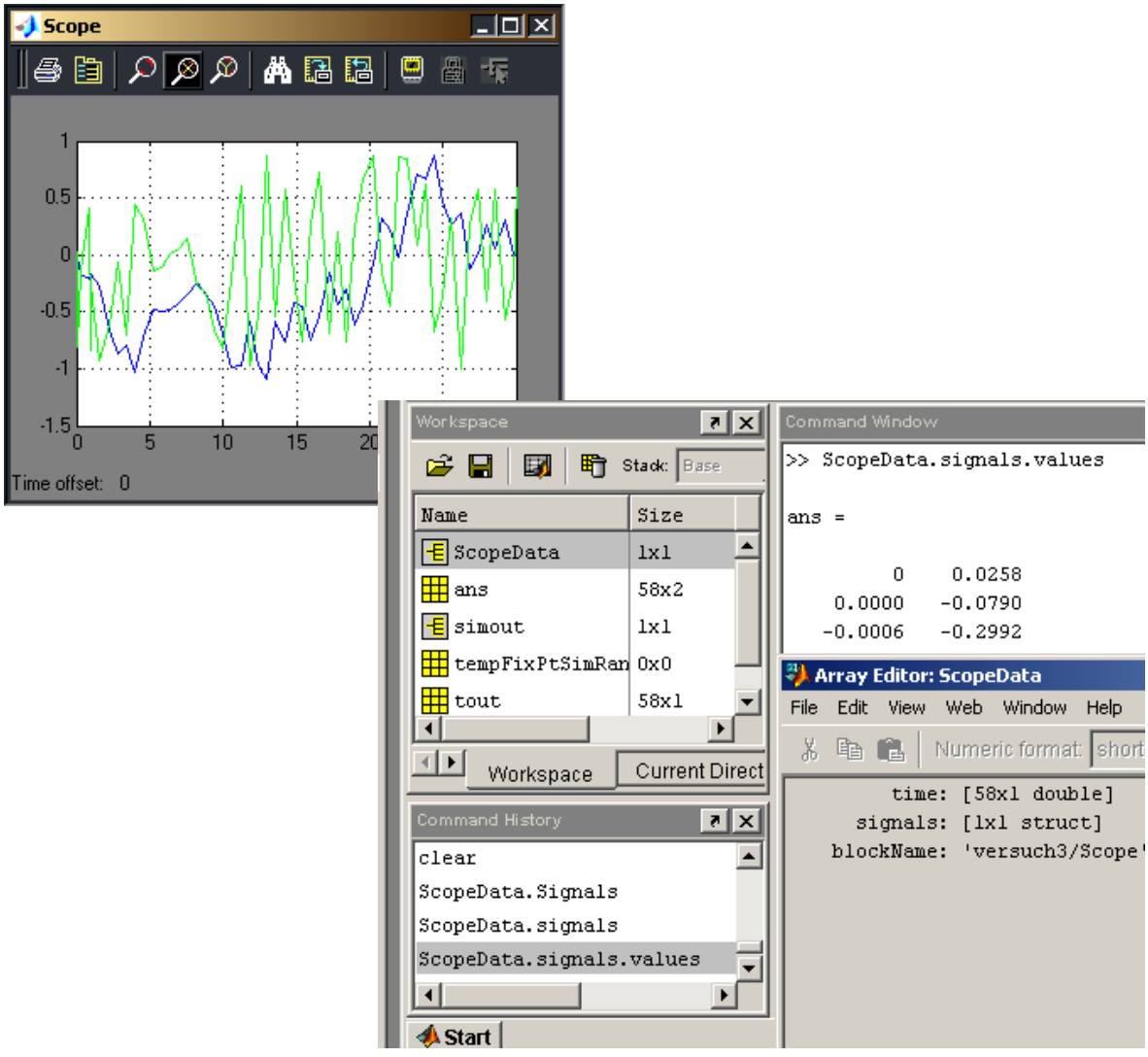
Sägezahn:



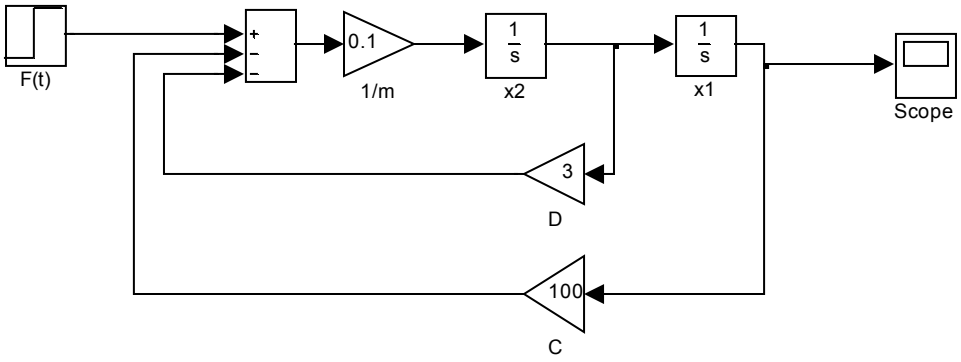
Rechteck:



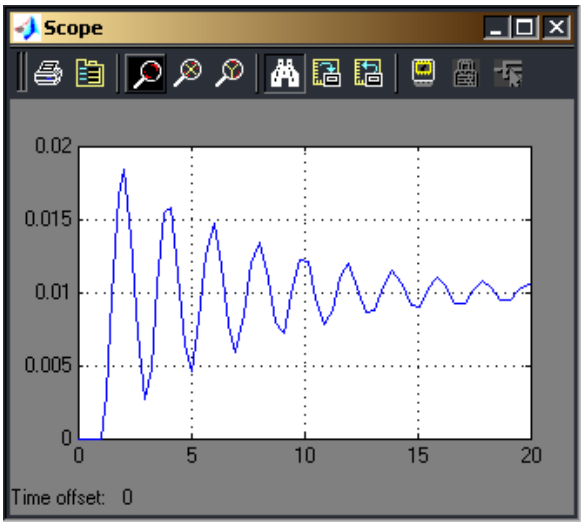
Random:



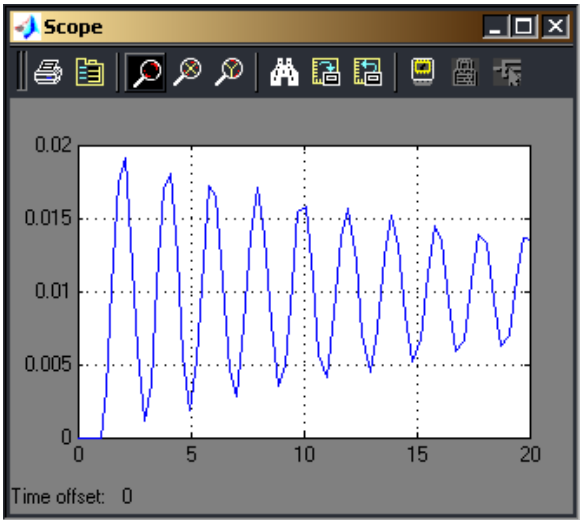
c) **Feder-Masse-Schwinger**



Sprungantwort :



F=1 N
C=100 N/m
D=3 N*sec/m
m=10 Kg



F=1 N
C=100 N/m
D=1 N*sec/m
m=10 Kg

→ Je kleiner die Dämpfung je länger die Schwingung,…
→ Je größer die Federsteife je kleiner die Auslenkung bei gleicher Kraft,…
→ Je größer die Masse je langsamer die Schwingung,…